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REMARKS

Claims 1-4 and 22 are currently pending in the application. Claim 1 was amended to include the subject matter of claim 21, which is now cancelled.

Claim 22 was rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner questioned how claim 22 could recite that $n=100$ when claim 1 recited that $n=10$. The Applicants have now amended claim 1 to recite that n is at least 10 and amended claim 22 to recite that n is at least 100. Therefore favorable action is solicited.

The Examiner also rejected claims 1-4 and 22 under 35 USC §103(a) as being unpatentable over **De Witt et al.** (US 5,714,127). It should be noted that the Examiner did not reject claim 21 in view of **De Witt et al.** Applicants' have amended claim 1 to incorporate the subject matter of claim 21. Therefore **De Witt et al.** do not teach or suggest the limitations of the current claim 1.

De Witt et al. disclose a system for multiple, simultaneous synthesis of compounds preferably using a reaction apparatus comprising a reservoir rack having a plurality of reaction wells.² These reaction wells are closed at one side and are open at the other side in order to fill in materials like substrates or solvents.³ **De Witt et al.** do not disclose an array that consists of tubes that are open at both sides in order that the reaction mixture can be passed through the tubes. The apparatus as disclosed by **De Witt et al.** is designed in order to introduce all substrates and solvents into the vessels, allow them to react, which is then followed by a work up procedure.⁴ This stands in contrast to the array as in amended claim 1 of the present invention, wherein substrates are reacted continuously during their passage through the tube reactors. Therefore **De Witt et al.** does not disclose the limitations of the current claims nor is there any suggestion to modify the disclosure to arrive at the current claims. In light of these arguments and amendments, Applicants respectfully request that the §103 rejections of claims 1-4 and 22 over **De Witt et al.** be withdrawn.

² **De Witt et al.**, column 8, lines 63-66.

³ **De Witt et al.**, Figs. 1-6, column 8, lines 63-67

⁴ **De Witt et al.**, column 13 line 19 to column 14 line 35.

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The Examiner rejected claims 1-4, 21 and 22 under 35 USC §103(a) as being unpatentable over *Alagy et al.* (US 4,780,196).

According to §103, in order to establish a prima facie case of obviousness, there must be (1) some suggestion or motivation to modify the references, (2) reasonable expectation of success and (3) the prior art reference must teach or suggest all of the claim limitations.⁵

Alagy et al. does not disclose all the limitations of the current invention, and furthermore provides no motivation or suggestion to modify its disclosure to arrive at the currently claimed invention.

In the case at hand, *Alagy et al.* disclose an improved hydrocarbon steam cracking method intended to produce ethylene and propylene. The method is based on the utilization of the multichannel system made of ceramic material, in which the charge and heat exchange fluids or refrigerants alternatively pass through the channels or rows of channels constituting a continuous assembly comprising a pyrolysis zone followed by a quenching zone.⁶

The Examiner argues that *Alagy et al.* disclose parallel through-channels in the form of tubes (D), surrounded by a shell. While it is true that there are tubes and a shell disclosed, they, however, do not disclose the current claims and furthermore are not arranged the same as is required in the current claims. In the tube reactor as disclosed by *Alagy et al.* the reactive gas containing hydrocarbon and steam are passed through a first group of tubes of the reactor, and the heating or cooling mediums are passed through a second group of tubes. As is shown in Fig. 1 of *Alagy et al.*, the hydrocarbon and steam mixture pass through channels (D), whereas, the heat exchange fluid pass through channels (F) parallel to channels (D).⁷ Contrarily, in claim 1 of the present invention, the tubes are "surrounded by a shell through which a heating or cooling medium can be conducted." In other words, the reaction mixture is passed through the tubes containing the heterogeneous catalysts and the heating or cooling mediums are passed through a shell that surrounds the tubes. The heating or cooling of the array according to the present invention is conducted by surrounding the tubes by a shell through which a

⁵ See MPEP §2143

⁶ *Alagy et al.*, abstract.

⁷ *Alagy et al.*, column 7, lines 56 to column 8 line 29.

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heating or cooling medium can be conducted. This is not the case in *Alagy et al.* where the heat exchange fluid passes through tubes parallel to the reaction mixture tubes.

Additionally, the Examiner argues that *Alagy et al.* discloses an apparatus which comprises a metallic tube bundle reactor/heat exchanger. However, the Applicant respectfully submits that this assertion is in error. *Alagy et al.* specifically discloses a tube reactor which is made from ceramic material. This is disclosed in column 4, lines 5-6, wherein it is stated "a plurality of channels of ceramic material". The reference encourages the use of ceramic material because it facilitates assembly of the reactor.⁸ Therefore *Alagy et al.* does not disclose the limitation of claim 1 requiring "a metallic tube-bundle reactor" and furthermore teaches away from the use of metallic tube-bundle reactor.

Furthermore, the Examiner argues that the *Alagy et al.* discloses that there can be any number of tubes. However, this still does not disclose the limitations of the current claims. In amended claim 1, it is claimed that if *n* tubes are present in an array, at least *n* heterogeneous catalysts are present also. This means that in each of *n* tubes, at least one heterogeneous catalyst must be present. *Alagy et al.* does not disclose the use of any catalysts inside the tubes.

The Examiner also continues to argue that the catalyst is worked upon and therefore does not limit an apparatus claim. The Examiner argues that Applicants' statement that the instant invention is "designed for testing of several different catalysts" is evidence that the catalysts are material worked upon. However, that something in an invention takes part in a reaction, or is "worked upon" in some way, does not mean that it cannot be contributive to an invention.⁹ MPEP §2115 is directed toward the occurrence where an object is merely worked upon by the invention and contributes nothing more. For Example, in *In re Casey*, the apparatus claim was directed to a taping machine where there was a brush attached to a supporting structure. In the claim, the brush had bristles such that the tape could detachably adhere and means for providing motion while the tape was adhered to the surface.¹⁰ In that case, the tape was not a part of the apparatus, nor

⁸ *Alagy et al.*, column 5, lines 47-50.

⁹ MPEP §2115

¹⁰ *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); MPEP §2115

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did it contribute to the structure.¹¹ However, in the case at hand, the catalyst contributes to the reaction taking place within the reactor. In such a circumstance, it does not limit an apparatus claim. This is not the case with the current claims.

The Examiner characterizes the catalysts of the present invention as being worked upon, however, the catalyst of the present invention is integral to the operation of the invention. In fact, it takes part in the reaction and "works upon" a reaction mixture. In the current invention, a fluid reaction mixture is introduced at one side of the tubes, passed through the tubes, and the reaction product can be obtained at the other side of the tubes. The heterogeneous catalysts that are present in the tubes catalyze the reaction of the fluid reactant in the tubes. A definition of catalyst is that it takes part in a reaction but is not changed during that reaction. Therefore, from the fact that heterogeneous catalysts are present in the tubes, a person having ordinary skill in the art knows that the heterogeneous catalysts are not the material that is merely worked on, but which catalyze the reaction of the fluid reactant.

Applicants' statement that the instant invention is "designed for testing several different catalysts" shows that there is interest in determining the activity of the catalyst, however, it does not change the fact that the catalyst is integral to the operation of the claimed reactor. Therefore, the heterogeneous catalyst is part of the array as claimed in amended claim 1 of the present application, and it is not a substrate that is merely worked on during the process.

In light of the foregoing arguments, the Applicants respectfully request that the §103 rejection in view of *Alagy et al.* be withdrawn.

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¹¹ See id.

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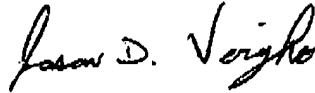
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